

## Environmental and psychological influences on adolescents' self-concept: teacher-student relationship as a moderator

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### ABSTRACT

Adolescence is a critical stage for the development of self-concept and psychological resilience. However, the impact of environmental and psychological factors on adolescents' self-concept through psychological resilience has not been fully explored. Meanwhile, the discussion on whether the teacher-student relationship moderates the relationship between psychological resilience and self-concept is relatively rare. Based on cognitive-behavioral and social learning theories, this study collected data from 404 Chinese adolescents through a questionnaire survey. It employed partial least squares structural equation modeling (SEM) to test the hypotheses. The study found that environmental and psychological factors significantly influence adolescents' psychological resilience, and psychological resilience mediates the relationship between environmental and psychological factors and self-concept. Moreover, the teacher-student relationship moderates psychological resilience and self-concept, particularly the positive teacher-student relationship, significantly promoting adolescents' self-concept. This research highlights the critical influence of psychological resilience and teacher-student relationships in shaping adolescents' self-concept. It provides empirical support for educational practice, highlighting the key role of environment, psychological factors, and good teacher-student relationships in adolescents' mental health and self-concept development.

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## 1. INTRODUCTION

Self-concept refers to an individual's perception, beliefs, and evaluation of themselves, encompassing cognitive, emotional, and social dimensions [1]. Adolescence is a critical turning point in individual psychological development and socialization. The self-concept formed during this period determines the individual's understanding of self-worth and profoundly impacts their academic performance, social adaptability, and mental health [2]. Self-concept is a core issue in adolescent psychological development, and its formation is complexly intertwined by multiple factors such as family, school, and social culture.

Recent studies indicate that adolescents are increasingly experiencing challenges in self-concept development, characterized by heightened self-doubt, identity confusion, and discrepancies between personal and societal expectations [3], [4]. Moreover, many scholars stated that adolescents show anxiety, depression, and even behavioral problems due to an insufficient self-concept. For example, some students' high dependence on academic performance makes their self-concept highly tied to academic success. Once their

grades are not ideal, it may lead to severe self-denial [5]. Meanwhile, the rapidly changing social and cultural environment has also led adolescents to face a contradiction between traditional cultural values and modern, personalized pursuits, constituting an additional psychological burden in forming their self-concept [6]. What is more serious is that the relationship between teachers and students is relatively one-sided in many current school environments. The interaction mode based on academic tasks often overlooks students' emotional needs, which further exacerbates the psychological isolation of some adolescents.

Although many studies have focused on the psychological development of adolescents, most have concentrated on the independent role of individual environmental or psychological factors [7]–[9], and the exploration of their joint mechanisms remains insufficient. In addition, research on the teacher-student relationship primarily focuses on its impact on academic achievement [10]–[12], while its potential moderating role in adolescent psychological development has not been fully explored. Psychological resilience refers to an individual's ability to adapt to adversity, stress, or major challenges [13]. Some scholars have pointed out that resilience plays a vital role in reducing academic stress, anxiety, and depression levels among adolescents [14], [15]. However, as a positive psychological resource, psychological resilience has not been systematically verified in its mediating role between environmental and psychological factors and self-concept. In other words, current research neglects to provide an integrated and multidimensional theoretical framework for developing an adolescent's self-concept, which limits the depth of theoretical research and hinders the effectiveness of practical interventions. Therefore, this study proposes an integrated model to explore how environmental and psychological factors influence adolescent self-concept through psychological resilience. It further analyses the moderating role of the teacher-student relationship in this process. Thus, this study aims to address the following research questions:

- i) Do environmental factors significantly predict resilience?
- ii) Do psychological factors significantly predict resilience?
- iii) Does psychological resilience significantly predict self-concept?
- iv) Does psychological resilience mediate the relationship between adolescents' environment, psychological factors, and self-concept?
- v) Does the teacher-student relationship moderate the relationship between psychological resilience and self-concept?

This study confirmed the relationship between individuals' cognition of the environment and their emotional responses, as outlined in cognitive behavioral theory (CBT) and social learning theory. Adolescents' perception of the surrounding environment is closely related to their emotional response. The environment's supportive factors promote psychological resilience by affecting individuals' emotional regulation ability and coping strategies. Through this theoretical perspective, we can understand how individuals develop positive psychological resources, such as psychological resilience, within a specific environment to cope with life's challenges effectively. Second, this study expands the role of psychological resilience in shaping self-concept and enriches the theoretical framework on how individuals adapt to their environment and develop self-cognition through psychological regulation. Ultimately, the moderating role of the teacher-student relationship offers a fresh perspective. It enriches our understanding of the role of the social support system (especially the teacher-student relationship) in shaping adolescent self-concept.

## 2. LITERATURE REVIEW

### 2.1. Environmental factors and psychological resilience

Environmental factors, including family support, school atmosphere, and social culture, play a fundamental role in shaping an individual's psychological quality by directly or indirectly influencing their cognitive and emotional development [16]. Among these, family support is particularly crucial, as it provides a sense of emotional security and belonging, which are essential for the psychological well-being of teenagers [17], [18]. Foster *et al.* [19] stated that a supportive family environment fosters adaptive coping strategies, enabling adolescents to handle stress more effectively. Beyond the family, school environments also play a significant role in contributing to psychological resilience. Positive interpersonal relationships, supportive teacher-student interactions, and well-established psychological support systems help adolescents develop confidence and coping mechanisms in response to academic and social challenges [20], [21]. According to CBT, environmental factors shape an individual's cognitive evaluations and coping strategies, which in turn influence their resilience [22], [23]. Additionally, some empirical studies stated that a supportive environment allows individuals to reframe stressors positively, adopt more adaptive cognitive patterns, and engage in effective behavioral strategies, thereby strengthening their resilience [21], [24]. Social learning theory also supports the idea that psychological resilience can be enhanced by helping people learn effective emotion management and stress-coping methods through role models, such as parents, teachers, and outstanding peers [25]. In other words, positive environmental factors significantly enhance the development of psychological resilience by offering individuals advantageous cognitive and emotional

resources. Thus, the following hypothesis (H1) is proposed: environmental factors significantly and positively predict psychological resilience.

## 2.2. Psychological factors and psychological resilience

Psychological factors, including emotional regulation, attribution style, and optimism, are crucial for managing stress and promoting psychological well-being [26]. Emotional regulation, which involves controlling emotional responses to stress, is key in shaping how individuals cope with adversity. Empirical studies suggested that individuals who can regulate their emotions effectively tend to employ healthier coping strategies, reducing emotional distress and enhancing resilience [16], [27]. According to Buckley and Sullivan [28], a positive attribution style helps to overcome difficulties and build self-confidence. The CBT further emphasizes that an individual's cognitive model—how they interpret stress—directly impacts their emotional and behavioral responses [15], [19]. For instance, individuals with high self-efficacy believe they can control their environment and are more likely to adopt adaptive coping mechanisms when faced with stress, resulting in lower emotional distress and higher resilience. Similarly, strong emotional regulation abilities enable individuals to manage stress-related negative emotions, preventing emotional upheavals that could undermine their resilience [16], [21]. Social learning theory suggests that through vicarious learning, such as imitating teachers and parents, individuals are more likely to develop positive internal beliefs and enhance their psychological resilience [25]. Therefore, psychological factors promote psychological resilience by shaping the individual's emotional and cognitive response patterns. We proposed hypothesis 2 (H2) as: psychological factors significantly and positively predict psychological resilience.

## 2.3. Psychological resilience and self-concept

Self-concept refers to individuals' perception and evaluation of their characteristics, abilities, values, and social roles [1]. Its stability is closely linked to mental health, as a well-defined and positive self-concept serves as a psychological foundation for coping with challenges [14], [15]. Psychological resilience is crucial in shaping and maintaining self-concept, particularly in adversity. Resilient individuals tend to interpret failures and challenges as temporary setbacks rather than indicators of personal inadequacy. Instead of allowing negative experiences to diminish their self-worth, they reframe difficulties as opportunities for growth, reinforcing a stable and positive self-concept [29], [30]. CBT supports this view, emphasizing that resilience, as a cognitive and emotional regulation mechanism, enables individuals to maintain a balanced self-perception even under stress. For instance, some empirical findings stated that in high-pressure academic settings, students with greater resilience are more adept at managing negative emotions, thereby preventing academic failures from undermining their self-concept [17], [31]. Similarly, Hussain *et al.* [13] also stated that psychological resilience helps individuals navigate social interactions confidently, thereby minimizing the influence of external criticism on their self-perception. Adolescents who exhibit high levels of resilience are more likely to manage difficult situations. Besides, according to social learning theory, when teenagers face setbacks, they will internalize this coping pattern and further consolidate their positive self-concept if they see people around them resolve difficulties with a positive attitude [32]. Hence, hypothesis 3 (H3) was proposed as: psychological resilience significantly and positively predicts self-concept.

## 2.4. Mediating role of psychological resilience

As an internal regulatory resource, psychological resilience is crucial in understanding how environmental and psychological factors influence self-concept. CBT posits that both environmental factors, including family support and school atmosphere, and psychological factors, such as emotion regulation and an optimistic attitude, influence the development of psychology by altering individuals' cognitive and emotional responses [22], [24], [33]. Psychological resilience enables individuals to manage external pressures and internal challenges more effectively, thus preserving a stable self-concept during adverse situations [23], [24], [32], [34]. Some empirical research indicated that good family support and positive psychology can enhance adolescents' emotional regulation ability, aiding them in maintaining positive self-evaluation amidst academic pressure and social challenges [19], [21], [35]. However, no direct evidence exists that psychological resilience mediates the relationship between environmental and psychological factors and self-concept. This study considers that environmental and psychological factors, including emotion regulation, can indirectly influence self-concept via psychological resilience. Hence, hypotheses 4 and 5 (H4 and H5) were proposed: psychological resilience mediates between environmental and psychological factors and self-concept.

## 2.5. Moderating role of teacher-student relationship

The teacher-student relationship is a crucial factor in adolescent psychological development. It provides emotional support and academic guidance and fosters self-confidence and social awareness [20], [36].

Based on social-ecological theory, this relationship is a vital social support resource that helps students maintain positive cognitive and emotional responses during challenges by offering emotional reassurance and behavioral guidance. Some empirical findings stated that teachers' support and care strengthen students' psychological resilience, enhancing their ability to cope with academic and personal difficulties [20], [37]. Furthermore, a positive teacher-student relationship contributes to forming a healthy self-concept by reinforcing self-cognition and self-evaluation, ultimately fostering a more stable and positive self-identity [38], [39]. Social learning theory suggests that teachers, as authoritative role models, have a stronger demonstration effect on students through their emotional regulation and coping strategies [32]. We consider that teacher-student can amplify the positive impact of psychological resilience on self-concept. Thus, hypothesis 6 (H6) was proposed: the teacher-student relationship moderates psychological resilience and self-concept.

The proposed framework, as seen in Figure 1, is grounded in CBT, social learning theory, and prior research. It posits that environmental factors (e.g., family support, school climate) and psychological factors (e.g., self-efficacy, emotion regulation) foster adolescents' psychological resilience (H1 and H2), which in turn enhances their self-concept (H3). Psychological resilience operates as a central mediator (H4 and H5), translating these upstream influences into a more stable and positive self-concept. Moreover, a positive teacher-student relationship strengthens the link between resilience and self-concept (H6). These paths explain how external supports and individual coping resources combine to shape adolescent self-identity.

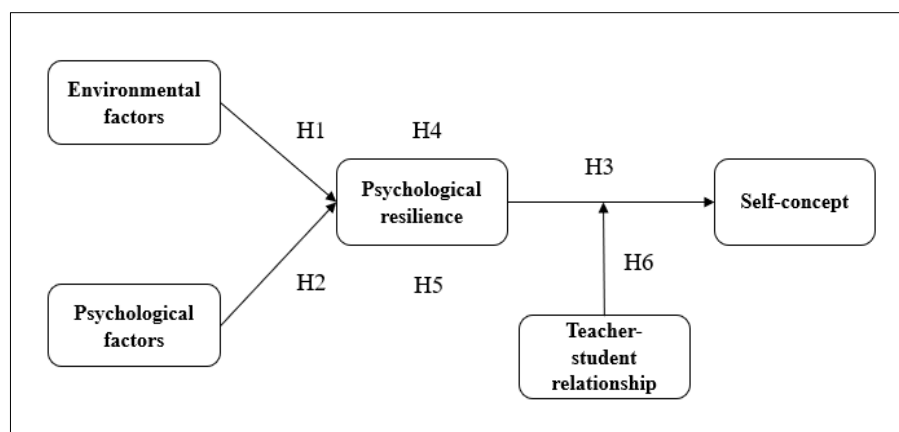


Figure 1. Framework of the study

### 3. METHOD

#### 3.1. Research design

This study adopts a quantitative research design and chooses a survey research strategy. Therefore, this study targets a specific population of Chinese high school students and undergraduates, using a questionnaire method to collect data and verify the theoretical model and hypotheses. This study employs convenience sampling to ensure the questionnaire link is accessible to high school and college students from different regions and levels. During the 3-week questionnaire collection period, 428 questionnaires were collected, covering students from 8 high schools and 7 universities. After eliminating invalid questionnaires, 404 remained, with an efficiency of 94.4%.

The sample of this study comprises 404 participants, consisting of 200 males (49.5%) and 204 females (50.5%), resulting in a relatively balanced gender distribution. Regarding age, students aged 15 to 17 accounted for 124 people (30.7%), students aged 17 to 19 accounted for 180 people (44.6%), and students aged 22 to 24 accounted for 100 people (24.8%). Regarding education level, among the participants of this study, 152 (37.6%) were high school students, and 252 (62.4%) were undergraduates, with undergraduates accounting for the majority. Regarding family location, 297 (73.5%) of the participants came from urban areas, and 107 (26.5%) came from rural areas. Concerning family structure, students with only children accounted for 226 people (55.9%), and students with more than one child accounted for 178 people (44.1%). We conducted independent sample t-tests and one-way ANOVAs on each group's resilience and self-concept scores. The results showed no significant differences between groups (all  $p > 0.05$ ). Furthermore, the sample encompassed multiple high schools and comprehensive universities in Chaozhou, Guangdong Province, indicating that this study sample was well-representative across regions and school types.

### 3.2. Research instruments

The questionnaire is a 5-point Likert scale. It comprises six parts: demographic information (gender, age, education level, hometown, and family structure), environmental factors, psychological factors, psychological resilience, self-concept, and teacher-student relationship, with 39 items. Environmental factors were measured using 5 items adapted from Gacesa *et al.* [40] to assess respondents' views on their feelings of support and positivity at home, school, and the community. For example, "My family members listen to me and give me advice." Psychological factors (6 items) were adapted to the scale of Simone *et al.* [41] to assess emotional regulation ability and optimistic attitude in the face of stress and challenges, such as "I generally view future challenges and opportunities with an optimistic attitude." Psychological resilience was measured by a 5-item scale developed by Trang and Thang [42] to assess adolescents' ability to remain calm, stick to their goals, transform stress, and re-establish psychological balance in adversity. Sample items included "I can turn stress into motivation." Self-concept was measured using a 6-item scale developed by Fatima *et al.* [43] to assess their self-concept, determination, goals, and effort levels. Sample items included "I feel confident in my abilities and worth." The teacher-student relationship (6 items) was adapted from Poling *et al.* [44] to express self-perceptions of teacher-student interaction quality, such as "My teacher cares about my academic progress and mental state." To ensure cross-cultural semantic equivalence, this study used back-translation techniques to eliminate ambiguity or cultural bias. Subsequently, a pilot test with 50 Chinese adolescents was conducted to verify item reliability and validity. Based on feedback, some wording was fine-tuned. These steps effectively ensured the scale's applicability in the Chinese context.

### 3.3. Data analysis

Data analysis uses two software tools: SPSS 27 and SmartPLS 4. First, the SPSS 27 descriptive statistical analysis of the questionnaire data is presented to describe the population's statistical information regarding the respondents. Subsequently, SmartPLS 4 was used to analyze the structural equation modeling (SEM), explore the path relationships between the various research variables, and test the assumptions and moderating effects.

## 4. RESULTS

### 4.1. Measurement model results

The factor loading (FL), Cronbach's alpha ( $\alpha$ ), composite reliability (CR), and average variance extracted (AVE) of the five main constructs met the statistical requirements, indicating that these constructs performed well regarding measurement reliability and validity. Specifically, the FL of all constructs exceeded 0.7,  $\alpha$  and CR exceeded 0.7, and the AVE values exceeded 0.5, indicating that the scales used had high internal consistency and convergent validity when measuring these constructs [45], as seen in Table 1. According to the Fornell–Larcker criterion, the square root of the AVE of each construct was greater than its correlation coefficient with any other construct, which indicated that these constructs had good discriminant validity in this study [46], as seen in Table 1. As shown in Table 2, according to the heterotrait–monotrait (HTMT) criteria, the HTMT values between all constructs were lower than 0.85, showing good discriminant validity [47]. In particular, the HTMT values of the interaction term "psychological resilience\*teacher-student relationship" were generally low, indicating no significant overlap between the interaction term and other constructs; therefore, it exhibited significant discriminant validity.

Table 1. Fornell–Larcker criterion

| Construct                    | $\alpha$ | CR    | AVE   | FL          | 1     | 2     | 3     | 4     | 5     |
|------------------------------|----------|-------|-------|-------------|-------|-------|-------|-------|-------|
| Psychological resilience     | 0.878    | 0.890 | 0.696 | 0.782-0.884 | 0.834 |       |       |       |       |
| Self-concept                 | 0.876    | 0.900 | 0.656 | 0.768-0.866 | 0.609 | 0.813 |       |       |       |
| Psychological factors        | 0.865    | 0.887 | 0.675 | 0.892-0.876 | 0.587 | 0.487 | 0.798 |       |       |
| Environmental factors        | 0.889    | 0.889 | 0.673 | 0.753-0.877 | 0.543 | 0.467 | 0.483 | 0.822 |       |
| Teacher-student relationship | 0.900    | 0.901 | 0.688 | 0.791-0.837 | 0.319 | 0.477 | 0.236 | 0.243 | 0.818 |

Table 2. Discriminant validity (HTMT)

| Construct                                             | 1     | 2     | 3     | 4     | 5     | 6 |
|-------------------------------------------------------|-------|-------|-------|-------|-------|---|
| Psychological resilience                              |       |       |       |       |       |   |
| Self-concept                                          | 0.677 |       |       |       |       |   |
| Psychological factors                                 | 0.654 | 0.539 |       |       |       |   |
| Environmental factors                                 | 0.605 | 0.517 | 0.540 |       |       |   |
| Teacher-student relationship                          | 0.358 | 0.526 | 0.263 | 0.272 |       |   |
| Psychological resilience*teacher-student relationship | 0.226 | 0.136 | 0.236 | 0.263 | 0.091 |   |

#### 4.2. Structural model results

The VIF values of all paths are less than 5, indicating no significant multicollinearity problem between the constructs, the model estimation is stable, and the results are reliable [45]. As shown in Table 3, environmental factors positively and significantly affect psychological resilience ( $\beta=0.338^{***}$ ); therefore, H1 is supported. Secondly, H2 considers that psychological factors positively and significantly affect psychological resilience. The path coefficient is 0.424, and the P value is 0.000. Therefore, this result also supports H2. The relationship between psychological resilience and self-concept is also significant and positive ( $\beta=0.451^{***}$ ); hence, H3 was supported. The model test results also indicate that the  $R^2$  value for resilience is 0.433, while the  $R^2$  value for self-concept is 0.512. According to effect size criterion, values of 0.26 and above are considered large effect sizes [45]. Therefore, this research model exhibits a “large effect” in explaining the variation in resilience and self-concept, indicating that the constructed theoretical framework possesses a strong predictive ability for these two core variables. The effect size ( $f^2$ ) analysis was conducted to evaluate the relative contribution of each exogenous construct to the endogenous variables in the structural model. Furthermore, for psychological resilience, both environmental factors ( $f^2=0.154$ ) and psychological factors ( $f^2=0.243$ ) demonstrated medium effect sizes [45], indicating that both constructs positively influence psychological resilience. In the case of self-concept, the largest effect was attributed to psychological resilience ( $f^2=0.228$ ), representing a medium effect [45]. This suggests that psychological resilience is central to shaping students’ self-concept.

Table 3. Hypotheses analysis

|    | Hypothesis                                        | Beta<br>(Path coefficients) | STDEV | T value | P value | $f^2$ | Result    |
|----|---------------------------------------------------|-----------------------------|-------|---------|---------|-------|-----------|
| H1 | Environmental factors -> psychological resilience | 0.338                       | 0.050 | 6.669   | 0.000   | 0.154 | Supported |
| H2 | Psychological factors -> psychological resilience | 0.424                       | 0.049 | 8.603   | 0.000   | 0.243 | Supported |
| H3 | Psychological resilience -> self-concept          | 0.451                       | 0.060 | 7.538   | 0.000   | 0.228 | Supported |

$R^2$  (Psychological resilience) =0.433;  $R^2$ (Self-concept) =0.512,  $^{***}<0.001$

As shown in Table 4, environmental factors significantly predict self-concept ( $\beta=0.152^{**}$ ), and psychological factors also directly influence self-concept ( $\beta=0.162^{**}$ ). Furthermore, the mediating effects of psychological resilience on these relationships were significant. Specifically, environmental factors influence self-concept through psychological resilience ( $\beta=0.153^{***}$ ), and psychological factors influence self-concept through psychological resilience ( $\beta=0.191^{***}$ ). These findings suggest that psychological resilience is a significant mediator in both paths, thereby supporting H4 and H5. Since both environmental factors and psychological factors can directly influence self-concept, these results suggest a partial mediation effect.

Table 5 presents that the interaction between psychological resilience and the teacher-student relationship significantly moderates self-concept ( $\beta=0.193^{***}$ ). This result indicates that the teacher-student relationship moderates the effect of psychological resilience on self-concept, with the interaction having a substantial positive impact. Therefore, H6 is supported, demonstrating that the teacher-student relationship strengthens the influence of psychological resilience on self-concept, as shown in Figure 2. The complete structural model in SmartPLS 4.0 is shown in Figure 3.

Table 4. Mediating analysis

|                 | Hypothesis                                                        | Beta<br>(Path coefficients) | STDEV | T value | P value | Result    |
|-----------------|-------------------------------------------------------------------|-----------------------------|-------|---------|---------|-----------|
| Direct effect   |                                                                   |                             |       |         |         |           |
|                 | Environmental factors -> self-concept                             | 0.152                       | 0.058 | 2.630   | 0.009   |           |
|                 | Psychological factors -> self-concept                             | 0.162                       | 0.055 | 2.955   | 0.003   |           |
| Indirect effect |                                                                   |                             |       |         |         |           |
| H4              | Environmental factors -> psychological resilience -> self-concept | 0.153                       | 0.033 | 4.614   | 0.000   | Supported |
| H5              | Psychological factors -> psychological resilience -> self-concept | 0.191                       | 0.034 | 5.629   | 0.000   | Supported |

$^{**}<0.01$ ;  $^{***}<0.001$

Table 5. Moderating analysis

|    | Hypothesis                                                              | Beta<br>(Path coefficients) | STDEV | T value | P value | Result    |
|----|-------------------------------------------------------------------------|-----------------------------|-------|---------|---------|-----------|
| H6 | Psychological resilience * teacher-student relationship -> self-concept | 0.193                       | 0.047 | 4.104   | 0.000   | Supported |

$^{***}<0.001$

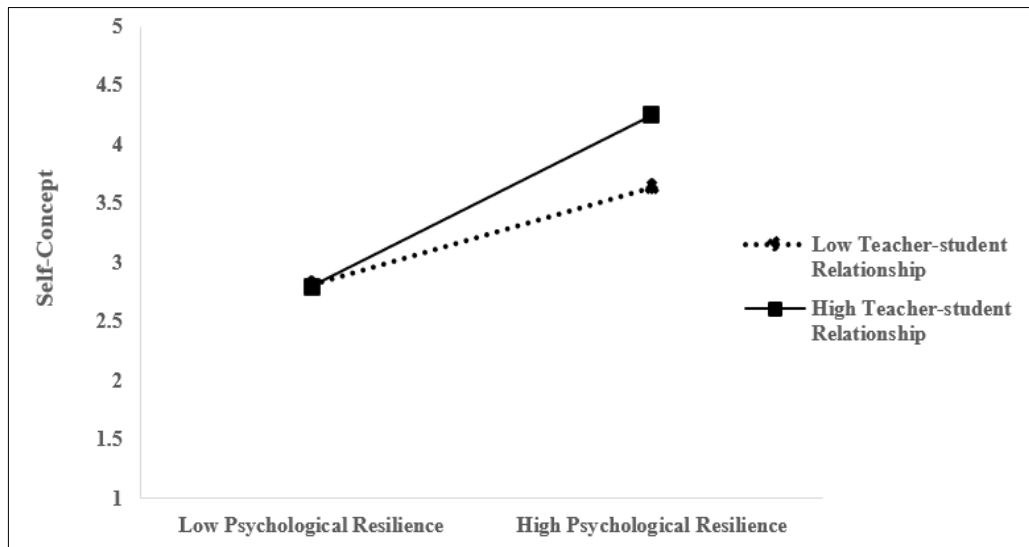


Figure 2. The moderating effect of teacher-student relationship

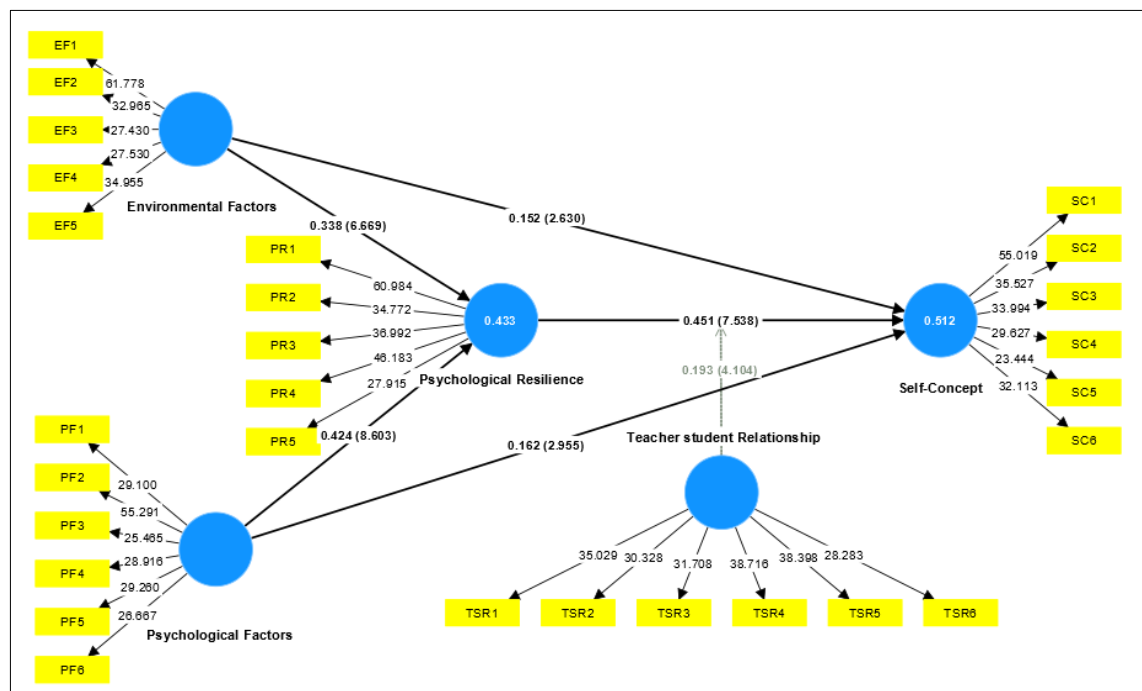


Figure 3. Structural model in SmartPLS 4.0

## 5. DISCUSSION

The study found that environmental factors significantly positively impact adolescent psychological resilience. Specifically, a supportive environment from family and school can significantly enhance adolescent psychological resilience, improving their ability to cope with stress and difficulties. This result is consistent with existing empirical research, especially on the impact of family support and school atmosphere on adolescent psychological resilience [17]–[19]. Family support provides emotional security and self-efficacy for adolescents, while the school atmosphere promotes students' emotional regulation and psychological growth by creating a positive, open, and inclusive environment [20], [21]. These positive effects of environmental factors indicate that the external environment enhances individuals' psychological resilience by providing them with resources and support. Then it enhances their adaptability and resilience in

the face of challenges. This finding is also supported by CBT. According to CBT, individuals' cognition and evaluation of the external environment directly affect their emotional reactions and behavioral patterns [21], [24]. Social learning theory holds that individuals acquire coping strategies by observing and imitating the coping behaviors of others [25]. Adolescents can develop positive self-cognition and emotion regulation strategies in a supportive family and school environment. Then, it enhances their psychological resilience and enables them to cope effectively with various life challenges.

This study also found that psychological factors significantly impact adolescents' psychological resilience. Specifically, adolescents show stronger psychological resilience with higher optimism and emotion regulation abilities. When individuals face stress and difficulties, believing they have sufficient ability to cope and can regulate their emotions effectively helps them confront challenges more successfully. This confidence, in turn, allows them to recover more quickly from setbacks. This finding is consistent with the results of Glassie and Schutte [26], which indicate that psychological factors are crucial in enhancing psychological resilience. The finding also aligns with CBT and social learning theory, because internal psychological factors deeply influence an individual's adaptive characteristics and psychological resilience [15], [32]. Individuals' emotional regulation ability can help them maintain psychological balance in stressful situations, reduce the interference of negative emotions, and thus enhance their adaptability and resilience in the face of difficulties [21]. Therefore, psychological factors play a vital role in constructing individual psychological resilience.

The results show that psychological resilience has a significant positive impact on adolescents' self-concept. Specifically, adolescents with higher psychological resilience can better face external pressure and challenges. They usually have a stronger self-concept and can maintain a positive self-evaluation in difficult situations. This result is consistent with the empirical findings [29]–[31] on psychological resilience, indicating that it helps adolescents maintain mental health in the face of adversity and promotes the positive development of their self-concept. Psychological resilience enhances adolescents' ability to adapt to adversity, promotes their recognition of self-worth and ability, and thus improves their self-concept. This is consistent with CBT "self-directed cognition" concept. Individuals construct self-concept through cognition and environmental stimuli response [48]. In addition, social learning theory also supports that observing and imitating positive coping patterns can further consolidate positive self-concept [25]. After experiencing the challenges of adversity, adolescents can form a more positive self-evaluation, which helps them establish a solid self-concept.

The research indicates that environmental and psychological factors indirectly influence adolescents' self-concept via psychological resilience. Supportive family and school environments significantly enhance adolescents' resilience [24], [27], while increased self-efficacy and emotional regulation further contribute to this resilience. Resilience factors enhance adolescents' self-evaluation, facilitating the healthy development of self-concept [22], [32]. In other words, environmental and psychological factors directly influence self-concept formation and indirectly enhance resilience, thereby affecting self-concept.

The findings indicated that the teacher-student relationship significantly moderated adolescents' resilience and self-concept. This finding aligns with current empirical research on teacher-student relationships. For example, the positive teacher-student relationship enhances students' emotional security, thereby aiding in the development of their self-concept [20]. Recognition and affirmation from teachers provide students with important perceived validation. When adolescents feel that their teachers recognize their abilities, their internal coping beliefs are strengthened, and they are more confident in transforming resilience into positive self-evaluations [37]. Ibrahim and El Zaatari [36] also found that students with good teacher-student relationships tend to perform better in mental health and academic performance. In addition, social learning theory suggests that teachers' supportive behaviors and coping demonstrations can be learned and imitated more effectively by students [32]. High-quality teacher-student interaction creates a safe emotional environment that significantly buffers students' negative emotions and helps them maintain self-esteem and cognitive clarity in stressful situations. This supportive context enables psychological resilience to be more effectively transformed into a solid self-concept.

There were several practical implications of the study. First, supporting the family environment, such as parents' emotional care and educational methods, has significantly impacted adolescents' psychological resilience and self-concept development. Therefore, family education should emphasize emotional support, communication, and mental health education to help children develop good coping strategies and maintain a stable psychological state. Schools should create an inclusive and caring environment at the school level and focus on students' emotional development and mental health, not just improving academic performance. Second, educators can help students establish positive self-evaluation and psychological resilience training through curriculum design and psychological counseling. For example, situational simulation and stress management workshops, help students identify and deal with situations that may affect their mental health and cultivate their ability to adapt to the environment and psychological



resilience. It is also recommended that schools introduce teacher training based on social emotional learning (SEL) and incorporate skills such as emotion recognition, positive feedback, and empathetic listening into regular teacher training. We also recommend that schools or education authorities carry out mental health literacy improvement projects and promote the “self-concept and resilience” themed education throughout the school. In addition, the quality of the teacher-student relationship plays a vital role in developing adolescents’ psychological resilience and self-concept. Therefore, schools should train teachers to have a keen emotional recognition ability and good communication skills to enhance their emotional connection with students. Teachers’ emotional support helps students’ academic progress but also helps them maintain a positive attitude and confidence when facing personal difficulties. Additionally, to help students learn to cope with real-world social stressors proactively, we recommend conducting stressful situation simulations and interactive narrative exercises at the class or grade level. Through positive narratives and peer sharing, students can internalize constructive coping strategies and experience validation and emotional support in a group setting. Then, students can further strengthen their resilience and enhance their self-concept.

## 6. CONCLUSION

This study examined how environmental and psychological factors influence adolescents’ self-concept through psychological resilience, and whether teacher–student relationships impact this process. This study found that ecological and psychological factors significantly boost resilience, which strongly predicts self-concept. Resilience partially mediates the effects of these factors on self-concept, and a positive teacher-student relationship further strengthens the resilience to the self-concept link. These results confirm our research questions and highlight resilience and supportive teacher-student interactions as key factors in fostering a healthy adolescent self-concept.

This study adopted a cross-sectional design. Although the correlation between the variables was revealed, the causal relationship could not be determined. Future research can adopt longitudinal or experimental research to track the psychological development changes of adolescents. Demographic factors (gender/age) may affect the research results. Adolescents may construct their self-concept differently at different stages of growth. Future research can further introduce age and gender as moderating variables to explore whether these factors affect the applicability of the research model. This study used convenience sampling to recruit subjects from multiple high schools and colleges in China, which, to some extent, limits the generalizability of the research results. Future studies should use more representative stratified random sampling or expand the sample source area to enhance the generalizability and external validity of the research results. This study mainly relies on questionnaire surveys. Although it has passed the reliability and validity test, the self-report questionnaire may have social expectation bias. Future research can combine qualitative research methods to verify further the mechanism of psychological resilience’s influence on self-concept. Based on the collectivist context of China, this study emphasizes the role of family support and teacher-student relationships in strengthening resilience and self-concept. In Western cultures, where independence is central, this mechanism’s path strength and manifestation may differ. Future research could validate this model in multicultural samples to examine its cross-cultural applicability.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

## CONFLICT OF INTEREST STATEMENT

The authors state no conflict of interest.

## INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

## ETHICAL APPROVAL

This study was conducted in Guangdong province, China. This study has been approved by the Human Research Ethics Committee of Universiti Sains Malaysia (Ethics Approval Number: USM/JEPeM/PP/24080722).

## DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author [JS], upon reasonable request.

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